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(19) (CA) **CANADIAN PATENT** (12)

(54) Recline Chair

(72) Diffrient, Niels,
U.S.A.

(73) Granted to Hauserman, Inc.
U.S.A.

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This invention relates generally as indicated to a recline chair and more particularly to a chair in which certain tasks may be accomplished more comfortably than at the usual chair and desk or chair and table position.

BACKGROUND OF THE INVENTION

It has been indicated that people tend to accomplish certain tasks more readily while in a comfortable position. Thus, typically, usual chair-desk or chair-table positions are not necessarily an ideal position in which to accomplish tasks such as reading, writing, or even utilizing a computer or word processor. It is therefore desirable to provide a task chair which is really in the form of a recline or lounge chair in which tasks such as reading, writing or even computer operation may readily be performed with the assistance of specialized tables or work surfaces. Although the present invention is designed primarily for offices, it will be appreciated that the recline chair of the present invention may also be used in homes or hotel rooms, for example.

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SUMMARY OF THE INVENTION

An arm recline chair which may be used with an ottoman is provided which includes a reclinable seat and back. The chair includes a frame which provides laterally separated pivots for the back and arms at approximately the ideal pivot location of the

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legs and back of the user. The back is mounted on armrests extending rearwardly from such pivots. The seat is pivoted at the forward portion of the frame and is suspended from links connected through control mechanisms to such arms for movement about a shorter radius than the back. In this manner the back reclines substantially while the seat only reclines slightly.

A headrest is mounted on top of the back and may be extended and retracted through an arc which is struck from the ideal pivot point of the head and back of the user. The headrest includes a vertically adjustable cranial support which ideally fits beneath the back of the cranium at the nape of the neck. The cranial support may be adjusted manually by handles or knobs from either side of the headrest through a rack and pinion squaring mechanism.

Both the headrest and the reclinable seat back and arms are provided with actuators which include lock mechanisms actuated from controls on the inside and at the forward end of each arm of the chair. The weight of the user on the seat of the chair automatically engages the lock mechanism for the headrest so that it can only be released through the appropriate control mechanism on the chair arm. The weight of the user on the seat of the chair also enables the control mechanism for the back recline actuator so that it then may be released through the respective control which is on the inside forward edge of the opposite arm. The actuator for the seat and back may be in the form of a gas spring and plunger while the actuator for the headrest may simply be in the form of a coil spring and plunger. When someone leaves the seat, if not accomplished through the controls, the seat, back, and arms and headrest will move automatically to an upright or extended position. Such functions are accomplished by seat weight responsive interlocks in each arm of the chair.

To the accomplishment of the foregoing and related ends the invention, then, comprises the features hereinafter fully described and particularly pointed out in the claims, the following

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description and the annexed drawings setting forth in detail certain illustrative embodiments of the invention, these being indicative, however, of but a few of the various ways in which the principles of the invention may be employed.

BRIEF DESCRIPTION OF THE DRAWINGS

Referring now to the annexed drawings:

Figure 1 is a side elevation partly broken away of a chair in accordance with the present invention with the seat and back in an upright position and the headrest extended;

Figure 2 is a side elevation of the present invention illustrating the seat and back reclined and the headrest retracted in full line position and extended in phantom line position;

Figure 3 is an enlarged fragmentary section taken substantially on the line 3-3 of Figure 1;

Figure 4 is a similar fragmentary section through the headrest support taken substantially on the line 4-4 of Figure 1;

Figure 5 is an enlarged elevation of the interlock mechanism in each arm enabling or disabling the control for the actuators for the headrest and back, respectively;

Figure 6 is a horizontal section taken substantially from the line 6-6 of Figure 5; and,

Figure 7 is a fragmentary horizontal section taken substantially from the line 7-7 of Figure 1 illustrating the adjustment mechanism for the vertically movable cranial support in the headrest.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring first to Figures 1 and 2, it will be seen that the chair of the present invention comprises two laterally spaced side frames 10 and 11 which may be identical in form. Each includes a front leg 12 and a rear leg 13 horizontally interconnected at the top by frame member 14. Each horizontal top frame member at the center includes an upwardly projecting ear 16 which provides a pivot 17 on each lateral side of the chair for the arms 18 and back 20. The front and rear legs of the side

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frames are interconnected by tubular elements seen at 22 and 23 and also by a tubular pivot 24 at the top of the front leg 12 which forms the pivot for the seat 25.

The seat 25 includes a frame 26 pivoted at its forward end on the transverse tubular pivot 24 and at its rearward end to the lower ends of suspension links 28 and 29 as indicated at 30 and 31.

The back 20 includes a frame shown generally at 33 rigidly connected to each arm through the vertically spaced connections 34 and 35 so that the back and arms form a rigid obtuse angle frame with each arm projecting forwardly of the back and laterally on each side of the frame to the pivot points 17. As indicated, the pivot points 17 are somewhat above the seat and forwardly of the back and preferably at the ideal pivot of the legs and back of the user.

Extending downwardly and rigidly from the lower end of the back frame are two slightly laterally spaced arcuate arms 37 to which is pivotally connected at 38 one end of gas spring piston-cylinder assembly 39. The piston or plunger rod 40 of such gas spring is pivotally connected to the center of the transverse tubular connection 22 through a bypass valve assembly 41 for such assembly. The bypass valve assembly may be operated through a release mechanism thereabove, shown at 42. Such device is actuated by the pull cable hereinafter described through a suitable linear-to-rotary motion mechanism. When the valve is open the gas spring is extended bringing the chair to the upright position seen in Figure 1 as opposed to the recline position seen in Figure 2.

A headrest indicated generally at 44 is provided above the back 20 and may be extended and retracted through the arc shown. In Figure 1 the headrest is shown as extended while in Figure 2 in the full line position retracted while extended in the phantom line position indicated at 45. The headrest includes a U-shape frame shown generally at 46 which includes a back plate 47 and rather widely spaced side plates 48 which are essentially quarter round at the top and bottom edges. (See Figure 7) An upper headrest slider 49 is secured to the lower center of the back plate and extends arcuately as indicated in Figure 1. The upper

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headrest slider 49 fits into a lower headrest slider 50 secured to the back, such sliders being seen in greater detail in Figure 4. Both are arcuate in configuration and are struck from the same center indicated at approximately the pivot point 52 which is the ideal pivot of the back and head of the user.

As indicated more clearly in Figure 4, the upper headrest slider 49 is provided at its lateral edges with semi-circular races seen at 52 and 53. The lower headrest slider is essentially U-shape in configuration enclosing the upper slider and includes arcuate legs 55 and 56 interconnected as seen at 57. Each leg is provided with a series of tapped apertures indicated at 59 which receive threaded stud assemblies 60 which include plastic capped ball noses 61. Such ball noses fit within the races 52 and 53 of the upper slide member. The lower slide member includes an inwardly-offset connecting flange seen at 64 which is secured to the frame 33.

The lower end of the upper slide member is bifurcated to provide room for the eye 67 of rod 68 of spring plunger assembly 69. The eye 67 may be secured to the upper headrest slider 49 through a suitable pin connection indicated at 70.

The rod 68 of the spring assembly 69 extends through a suitable spring loaded lock plate mechanism seen at 72 in Figure 1 which is similar to a simple door closure lock mechanism which will lock the rod against movement depending upon its angle with respect to the axis of the rod.

Referring now more particularly to Figure 3, it will be seen that the spring mechanism 69 is mounted on an offset pivot 75 within cylindrical housing 76. Also as seen in Figure 3 the offset pivot 75 is mounted on arms 77 and 78 which are welded to back channel 79 which forms part of the frame 33. A base plate 81 is secured to the offset pivot which in turn supports the spring housing 76 and a flapper valve 82 may be provided in the center of the housing through such base plate to enable air to enter the spring housing as the plunger spring rod 68 extends.

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Referring now to Figures 5 and 6, it will be seen that each arm 18 of the chair is a mirror image of the other, the far or opposite side arm as seen from the position of Figures 1 and 2 being illustrated in Figures 5 and 6. Each arm includes a somewhat central vertically extending plate 85 on top of which is provided a shelf 86 which includes a downwardly curved front 87 and an upturned outside flange 88. The shelf provides the support for the armrest cushion 89 seen more clearly in Figures 1 and 2. The plate 85 also includes an outwardly projecting pin providing pivot 17 on the base frames 10 and 11.

Projecting inwardly from each plate 85 is a generally triangular wall 92 which generally conforms to the profile of the plate 86 but somewhat smaller. The wall 92 is appropriately slotted or notched in certain areas and is provided with a cover plate, not shown, on the side toward the viewer in Figure 5. The wall 92 and the associated cover provides a housing for the interlock and control mechanism illustrated, it being appreciated that there will be one such interlock and control mechanism in each arm. The control mechanism in the arm illustrated may control the spring loaded lock mechanism 72 for the headrest 44 through pull cable 94 while the mechanism in the arm nearest the viewer may control the bypass valve 41 through the release mechanism 42 or the gas piston-cylinder assembly 39 through the pull cable illustrated at 95 in phantom lines. The interlock and control mechanisms operate in essentially the same manner although function somewhat differently as far as enabling or disabling the respective actuators.

It will be seen that each supporting link 28 and 29 is not pivotally connected directly to the arm 18 but is rather pivoted at 97 to one end of a rocker arm 98 which is in turn generally centrally pivoted at 99 to the plate 85. The opposite end of the rocker arm indicated at 101 is secured to a tension spring 102, the opposite end of which is anchored at 103 to the plate 85. The spring tends to move the rocker arm in a clockwise direction to the full line position illustrated in Figure 5 and will do so

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without the weight of a user in the seat. Clockwise movement of the rocker arm is limited by engagement at 105 between the upwardly offset portion 106 of the rocker arm and the top wall of the housing. When the weight of a user is on the seat, the rocker arm will move to the phantom line position indicated at 108 limited by engagement of the circular recess on the underside of the arm indicated at 109 with the stop 110 also secured to the wall.

It will be seen that the rocker arm 98 includes a third relatively short downwardly projecting arm 112 pivoted at 113 to inverted U-shape slider 114. The slider 114 is mounted for horizontal sliding movement on top pull cable guide block 115, such cable also extending through to an aperture in end pusher plate 116 on the end of the slider. Rocking of the arm 98 will thus move the slider pusher plate back and forth from the full line position seen to the phantom line position seen at 117 corresponding to the phantom line position 108 of the rocker arm. The pull cable includes a bead or cleat secured thereto indicated at 118 against which the plate 116 pushes. The cable extends beyond the cleat 118 and is provided with a further bead or cleat 120 after the cable has passed through pusher plate 121 on control lever 122. The control lever is pivoted on pin 123 and is urged in a counterclockwise direction as seen in Figure 5 by coil spring 124. An inwardly projecting control knob may be mounted on the distal end of the control lever 122 seen at 126. The lever is mounted for movement between stops 127 and 128 formed by the housing wall.

The spacing of the beads or cleats 118 and 120 is such that when the chair is empty the control levers 122 will be inoperative. Pulling the cable against its spring pressure by movement of the plate 116 to its full line position moves the bead or cleat 120 beyond the effective movement of the plate 121. It is only when the plate 116 is in the phantom line position that the bead or cleat 120 will be against the plate 121 so that

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movement of the lever 122 in a clockwise direction will be effective to pull the respective cable. This is, of course, accomplished by someone sitting in the chair pulling the links 28 and 29 downwardly against the tension of spring 102 causing the rocker arm 98 to move in a counterclockwise direction to its phantom line position retracting the plate 116 to the position 117.

For the headrest spring mechanism, when the chair is empty the lock mechanism 72 will be released so that the headrest 44 will extend and may be moved manually against the pressure of the spring mechanism. When someone sits in the chair, the lock mechanism will then be engaged and can only be released by operation of the associated lever. In this manner, the user may adjust the position of the headrest either manually or by simply moving the head back but only when the associated lever is actuated.

When the chair is empty, the gas spring 39 will be extended to its upright position. When someone sits in the chair, the associated control lever will be enabled and the user may readily then recline the chair through the use of the associated lever by simply leaning backwardly. The chair may be locked in the desired position of recline simply by releasing the lever. When the user desires to get out of the chair, the lever is again actuated and the gas spring will assist the user to an upright position. If for some reason the user gets out of the chair with the back still reclined, the weight being removed from the seat will then urge the bead or cleat 118 forwardly causing the chair automatically to move to its upright position.

In the illustrated chair it is noted that as the back and arms recline through approximately 25° of recline about the pivot 17, the seat will recline approximately 4° to 5° about the pivot 24, such extent of recline for the seat being controlled by the relatively short radius between the pivot 17 and the pivotal connection 97 at the upper ends of each seat suspension link 28 or 29. The headrest may move through an arc of approximately 32° about the pivot or center 52.

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Referring again to Figures 1 and 2 and in addition to Figure 7, it will be seen that the headrest includes an outer cushion or pad 130 which extends in curved fashion around the top and bottom of the headrest as indicated as well as a semi-circular somewhat more rigid, though nonetheless foamed, cranial support 131 which is vertically movable within the headrest. The internal support 131 is the principal head-neck support of the headrest and is designed to fit under the cranium or skull at the nape of the neck. The cranial support 131 may be vertically moved manually through the use of knobs 132 on the ends of shaft or rod 133 projecting through slots 134 on each side of the headrest. As seen more clearly in Figure 7, such knobs are mounted on the outer ends of such shaft which extends completely through the headrest with accomodating slots being provided in the forwardly projecting portions 48 of the frame 47, and plastic fittings 137 and 138.

As seen more clearly in Figure 7, the neck roll or principal head support 131 is mounted between two semi-circular side plates 140 which are interconnected by transverse plates or frame members 141 and 142 which are horizontally spaced to accomodate the transverse shaft 133. A spur gear seen at 144 is secured to the shaft 133 at each end and is in mesh with a rack gear 144 which is secured to the back plate 47 of the headrest U-shape frame. The rack and pinion mechanism at each end of the transverse shaft 133 simply acts as a squaring mechanism so that the shaft may be moved vertically from either end without binding. Vertical movement of the support 131 permits the flexible foam pad 130 to conform to the vertical position of such principal cranial or neck support. The upper headrest slider 49 includes a plate 147 secured to the projecting end thereof which is in turn secured by fasteners 148 to the back plate 47 of the headrest frame 46. The outer surfaces of the headrest may be provided with fabric or vinyl covered foam padding as seen at 150 and 151. In any event, the neck roll or principal head support 131 may readily be manually adjusted vertically within the head support to acheive the most comfortable position for the user.

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It can also be seen that both the seat and back may be provided with shells indicated at 153 and 154, respectively to accommodate the seat and back cushioning seen at 155 and 156.

Also, as noted in Figure 2, the chair of the present invention is designed to be utilized with an ottoman indicated generally at 158 which may include a frame 159 generally similar in configuration to the frame of the chair and provided with padding 160 to support the legs of the user in an elevated position. It will also be appreciated that the radius arms 37 and the gas spring assembly 39 at the bottom of the chair as well as the fixed and movable headrest sliders at the top of the back may be enclosed by suitable bellows having the general configuration shown by the dotted lines 162 in Figure 3.

It can now be seen that there is provided a recline chair designed for use with associated furniture such as shown in applicant's copending applications noted above in which tasks such as reading, writing and even the use of computers may readily be accomplished. Such chairs, although designed for use in an office environment, may readily be used in the home or elsewhere.

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CLAIMS:

1. A chair comprising a seat and back, headrest, means to recline said back and seat in a ratio greater than 1, and means angularly to adjust said headrest with respect to said back about a pivot at the approximate ideal pivot of the head and back of the user.

2. A chair as set forth in claim 1 wherein said back and seat recline ratio is on the order of 5 to 1.

3. A chair as set forth in claim 1 wherein said back and headrest recline is about a pivot located at the approximate ideal pivot of the legs and back of the user.

4. A chair as set forth in claim 1 including arms extending forwardly of the back on each side thereof and fixed thereto, said back and headrest pivot being located at the forward end of said arms and above said seat.

5. A chair as set forth in claim 4 including a seat pivot at the forward end thereof, and link means supporting the rearward end of said seat, said link means also being connected to the arms, but for movement through the shorter radius than said back.

6. A chair as set forth in claim 4 including actuator means for said back and separate actuator means for said headrest, and control means for each actuator in the respective arms.

7. A chair as set forth in claim 6 including interlock means in each arm operative to enable the respective control means in response to the presence of a user in the chair.

8. A chair comprising a reclinable back, a headrest mounted on said back, and an adjustable cranial support mounted within said headrest.

9. A chair as set forth in claim 8 including control knobs projecting laterally from the headrest operative to adjust the cranial support.

10. A chair as set forth in claim 9 wherein said cranial support includes a half-round support vertically movable inside the headrest.

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11. A chair as set forth in claim 10 including a shaft interconnecting said control knobs, and a squaring mechanism in said headrest ensuring each end of said shaft moves uniformly.
12. A chair as set forth in claim 11 wherein said squaring mechanism comprises pinions on each end of said shaft, and racks in said headrest in engagement with said pinions.
13. A chair as set forth in claim 12 wherein said shaft extends through slots on each side of said headrest with said knobs being positioned on the outside of said slots.
14. A chair as set forth in claim 8 wherein said headrest is mounted on top of said back for arcuate extension and retraction.
15. A chair as set forth in claim 14 wherein said arcuate extension and retraction is struck from a center at the approximate ideal pivot point of the head and back of the user.
16. A chair as set forth in claim 15 including actuator means to urge said headrest to its extended position.
17. A chair as set forth in claim 14 including a fixed and movable arcuate slides for said headrest, and means interconnecting said slides for relative arcuate movement.
18. A chair as set forth in claim 17 wherein said movable arcuate slide including semi-circular slots, said fixed slide including adjustable plastic buttons adapted to fit within said slots.
19. A chair comprising a reclinable back and a headrest mounted on top of the back, and means to extend and retract said head rest through an arc struck from a center at approximately the ideal pivot point of the head and back of the user.
20. A chair as set forth in claim 19 including a movable arcuate slide connected to said headrest and a fixed slide connected to said back.
21. A chair as set forth in claim 20 wherein said movable slide includes laterally extending semi-circular grooves and said fixed slides include adjustable spherical buttons fitting in said grooves.

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22. A chair as set forth in claim 19 including spring actuator means tending to move said headrest to an extended position.

23. A chair as set forth in claim 22 including interlock means operative to render said actuator means inoperative in response to the weight of a user in said chair.

24. A chair as set forth in claim 19 including an adjustable cranial support mounted in said headrest.

25. A chair as set forth in claim 24 including control knobs projecting laterally from the headrest operative to adjust the cranial support.

26. A chair as set forth in claim 25 wherein said cranial support includes a half-round support vertically movable inside the headrest.

27. A chair as set forth in claim 26 including a shaft interconnecting said control knobs, and a squaring mechanism in said headrest ensuring each end of said shaft moves uniformly.

28. A chair as set forth in claim 27 wherein said squaring mechanism comprises pinions on each end of said shaft, and racks in said headrest in engagement with said pinions.

A 29. A chair comprising a reclinable back, a headrest mounted on top of the back for extension and retraction therefrom, actuator means tending to move said

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back to an upright position and said headrest to an extended position, lock means, for said actuator means, control means for said lock means, and means responsive to the weight of a user in said chair to enable said control means.

30. A chair as set forth in claim 29 comprising arms, respective actuator means for said back and headrest, and respective control means for said actuator means, one at the forward end of each arm.

31. A chair as set forth in claim 30 including means responsive to the weight of the user to lock the lock means for the actuator for said headrest, and means to release the lock means for the actuator for said headrest in response to movement of said respective control means.

32. A chair comprising a base, a seat pivoted at its forward end to said base, a back also pivoted to said base at a different location thereon and at approximately the ideal pivot location of the legs and back of the user, and a headrest mounted on said back for arcuate movement about the approximate ideal pivot of the head and back of the user.

33. A chair as set forth in claim 32 wherein said back includes forwardly projecting arms fixed with respect to said back, said arms being pivoted at their forward end at such approximate ideal pivot location of the legs and back of the user.

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34. A chair as set forth in claim 33 including actuator means urging said headrest to the extended position and the back to an upright position.

35. A chair as set forth in claim 34 including arms for said chair, and control means in each arm controlling said actuator means.

36. A chair as set forth in claim 35 including interlock means in each arm operative to enable each control means in response to the weight of the user in said chair.

37. A chair comprising a reclinable back and a headrest mounted on top of the back, and means to extend and retract said headrest through an arc struck from a center at approximately the ideal pivot point of the head and back of the user.

38. A chair as set forth in claim 37 including spring actuator means operative to extend said headrest.

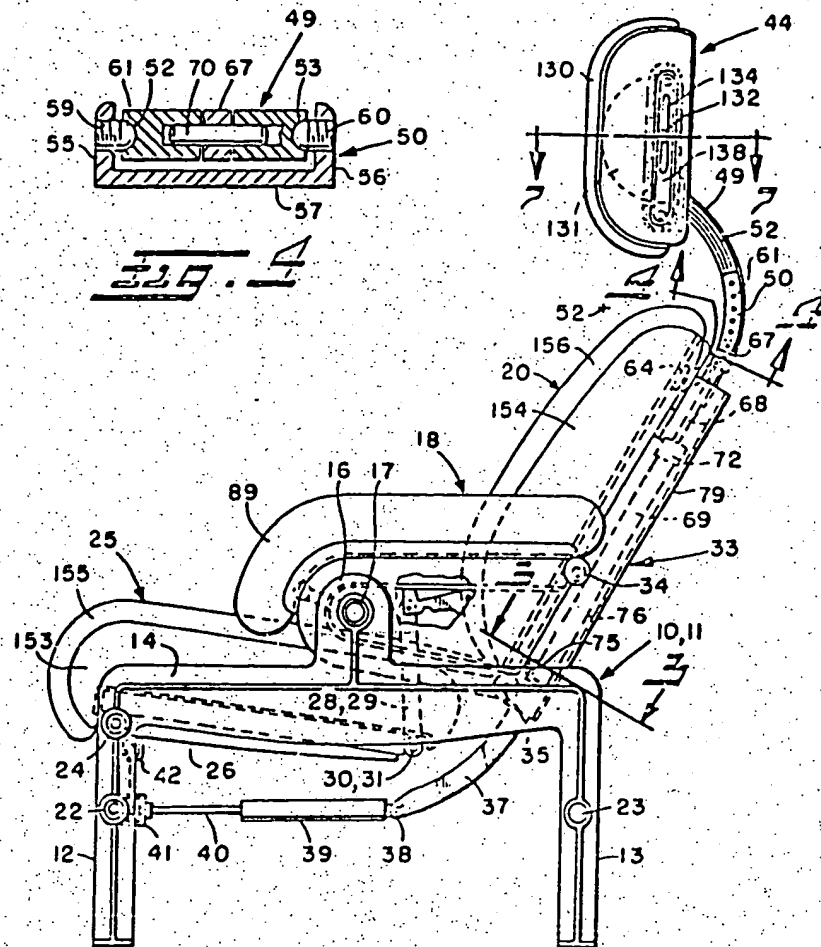
39. A chair as set forth in claim 38 including means responsive to the weight of a person in said chair to disable said spring actuator means.

40. A chair as set forth in claim 39 including control means operative to enable said spring actuator means in response to the weight of a person in said chair.



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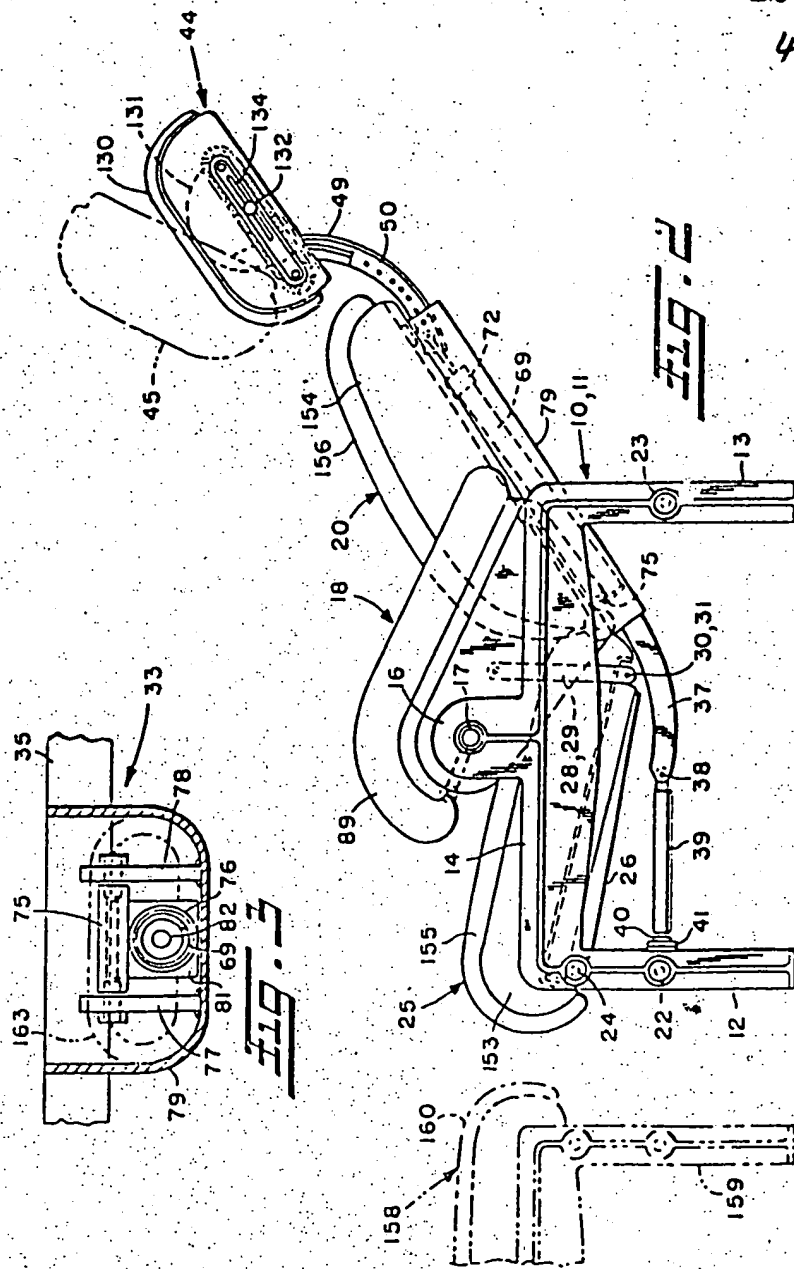
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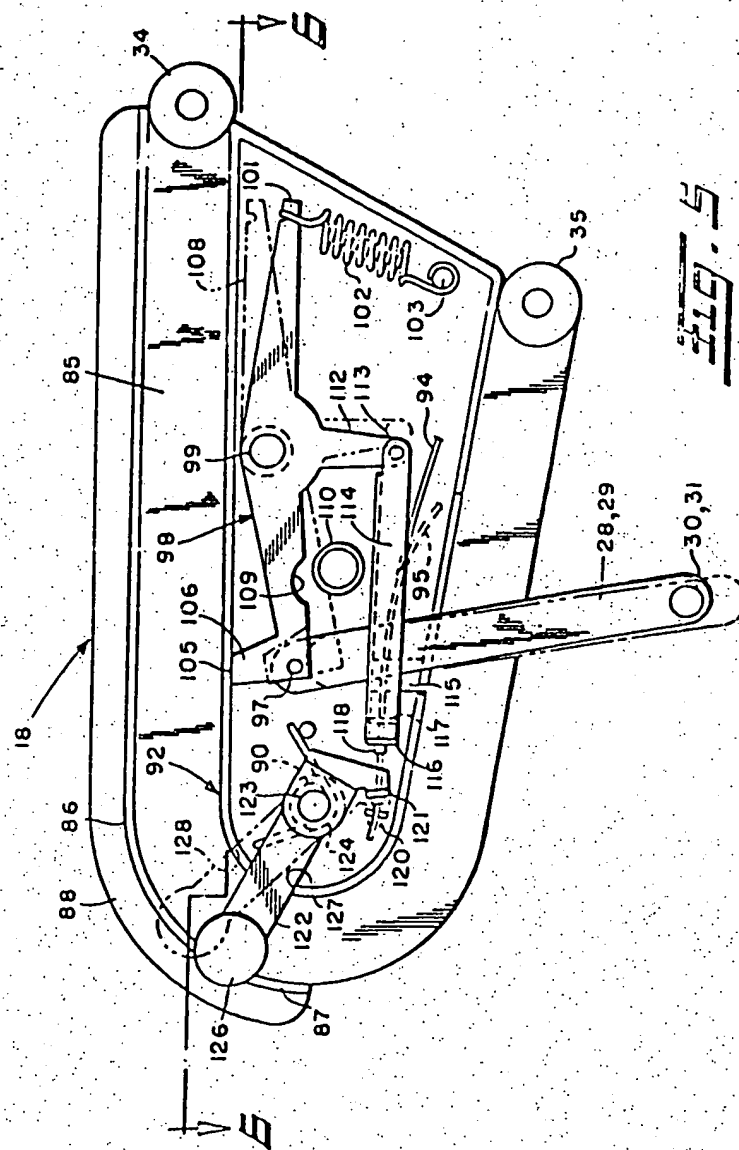
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